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ABSTRACT

This study was designed to assess the effects of three treatment levels involving micro-teaching with video-tape playback and strategy analyses on the teaching strategies selected by secondary science teaching methods students. Three groups of ten students each were randomly assigned to three treatment levels. All subjects taught a pre-treatment and a post-treatment peer group lesson; both were video-taped. Each student viewed his own pre-lesson, and before the taping of the post-lesson, the following instructions were given: group 1 - no instruction (control); group 2 - instruction in how to use the Teaching Strategies Observation Differential (TSOD) to assess their pre-lesson; group 3 - same as group 2 plus further instruction in how to assess teaching strategies. Trained raters used the TSOD to analyze the post-lessons for the degree of directness/indirectness exhibited by each subject in their teaching style after treatment. Using ANCOVA, significant differences were found between group 3 and group 1 and between group 2 and group 3, indicating a cumulative effect of the treatment procedures. (MH)

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# THE EFFECTS OF MICRO-TEACHING WITH VIDEO-TAPING ON THE TEACHING STRATEGIES OF PRE-SERVICE SECONDARY SCIENCE TEACHERS

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# THE EFFECTS OF MICRO-TEACHING WITH VIDEO-TAPING ON THE TEACHING STRATEGIES OF PRE-SERVICE SECONDARY SCIENCE TEACHERS

## PURPOSE

This study was designed to assess the effects of three treatment levels involving micro-teaching with video-tape play back and strategy analyses on the teaching strategies selected by secondary science teaching methods students.

## TREATMENT PROCEDURES

In order to measure the above effects, three intact groups of ten students each were randomly assigned to three treatment levels. All subjects taught a pre-treatment and a post-treatment peer group lesson. Both of these lessons were video-taped; the first to be used as part of the treatment and also as a concomitant variable in the data analysis; and, the second to be analyzed for any influence of treatment on the teaching strategies employed by the subjects. The treatment levels varied in the following manner:

Level I -- After the students in this group were taped while micro-teaching a self-selected and designed lesson to their peers, they were asked to schedule a personal and private viewing of the tape. No instructions were given in relation to what they should be looking for in the tapes except that they should be more concerned with the teaching act rather than the more cosmetic concerns of appearance, mannerisms and voice. After each student was taped and had an opportunity to view his pre-lesson, they were each taped in a post-lesson session.

Level II -- The only variance in the activities of this group when compared to Level I is that after the pre-lesson was taped, they received instruction in the use of the Teaching Strategies Observation Differential (appendix) which they were required to use while viewing their pre-lesson in private. The coding sheets that resulted from these private viewings were collected but not discussed with the subjects.

Level III -- The subjects in this level received the same instruction in the use of the TSOD. The viewing procedures of the level differed from the others in that after the initial personal viewing by the subjects, they were required to schedule a viewing session with the instructor of the course in which the research was being conducted. During this session the strategies employed by the subjects were coded by both the instructor and the subject. No efforts were made to place a value judgement on the selection of strategies. The main task was to systematically define the type of strategy exhibited in the lesson.

## DATA COLLECTION AND ANALYSES

Data on the dependent variable were collected by a trained rater. This rater used the TSOD to analyze the post-treatment tapes for the degree of directness/indirectness exhibited by each subject in their teaching style after treatment. The TSOD can be used to categorize teaching style on a continuum from expository/direct to inductive/indirect (see appendix).

The data were analyzed through the use of an ANCOVA procedure. The degree of directness as measured by the TSOD on the pre-lesson was used as the

covariate in this analysis. The selection of ANCOVA and covarying on the pre-lesson data was done in order to remove any selection bias resulting from the use of intact groups and to increase the statistical power of the hypotheses testing. Also, in order to increase statistical power, an apriori decision was made to test all hypothesis at the .10 alpha level and identify Level I as the control group for post hoc analyses.

## RESULTS

Table 1 shows the means and standard deviations of the post-treatment teaching strategies of the three micro-teaching levels as measured by the TSOD. Analyses of the data through the ANCOVA procedure indicated that a significant difference existed among the three means ($p < .001$) (Table 2).

TABLE 1

MEANS AND STANDARD DEVIATIONS OF THE POST-TREATMENT TEACHING STRATEGIES OF THE THREE MICRO-TEACHING LEVELS AS MEASURED BY THE TSOD

| Treatment | $\bar{X}$ | S.D. | n |
|---|---|---|---|
| Level I | 2.6 | 1.0 | 10 |
| Level II | 3.7 | .5 | 10 |
| Level III | 5.7 | 1.5 | 10 |

TABLE 2

ANCOVA TABLE ON THE POST-TREATMENT TEACHING STRATEGIES WITH THE PRE-TREATMENT STRATEGIES AS A COVARIATE

| Source | DF | MSq | F | Significance |
|---|---|---|---|---|
| Treatment | 2 | 15.85 | 17.37 | .001 |
| Residual | 26 | .91 | | |

Post hoc comparisons using the Dunnett test showed differences between Level III and Level I (control) and Level II and Level I ($p < .01$). Other pair-wise comparisons using the Newnan-Keuls technique supported the above analysis and picked up a difference between Level I and Level II. Thus, one may conclude that the three group means were all different with the greatest influence of chance being less than .05. The order of these difference showed the Level III subjects to use more indirect teaching strategies than Levels I and II and Level II subjects are more indirect than Level I.

## CONCLUSIONS

These trends seem to indicate a cumulative effect of the treatment procedures. That is, if one wants to influence teaching strategies, having students systematically analyze micro-lessons will have a statistically significant but minimal impact. While, providing non-biased interaction with an instructor after the systematic analysis will cause another full standard deviation shift in the same direction.

One of the implications of this research is that there may be certain advantages to individualized or self-paced teacher preparation programs. But let us not forget to build in opportunities for students to interact with the professors. The clarity and on-task guidance that can be provided may help maximize some of the outcomes.

# APPENDIX

## Teaching Strategy Observation Differential TSOD

### I. NON-EDUCATIONAL ACTIVITIES

$0_1$ Non-educational activities beyond the teachers control.

This category includes class interruptions, such as announcements on the intercom, which are not under the control of the teacher. This zero rating is not averaged into the overall rating.

$0_2$ Teacher controllable non-educational activities.

This category includes managerial tasks (e.g., taking role), off-subject discourse and other activities which the observer judges to be "non-educational" but are normally expected to be susceptible to teacher influence.

### II. DIRECT VERBAL

In this category the students are either passive or at most responding only in a limited verbal way to teacher stimuli.

1. Facts: e.g., direct exposition of content as in lectures by the teachers. Students are involved only as listeners.

2. Direction or opinion: e.g., direct instruction on "how to" or direct influence on class activities through stated opinions. The students are involved only as listeners but the teacher's talk is pressured to be a prelude to student activity.

3. Limiting questions: questions structured for a definite answer, or for which only the "correct" answer is accepted. Student involvement is limited to one word or phrase response to teacher questions.

### III. DIRECT NON-VERBAL

In this category, student activity is heavily teacher dominated but includes non-verbal activity as well as verbal.

4. Demonstration: direct instruction using equipment, books, chalkboard, etc., either before the whole class or in a manner as would affect most of the class, e.g., showing several individuals or small groups "how a reaction must be obtained." The students role is that of observer as well as listener but interaction with the teacher is limited to simple clarification of teacher verbalization.

5. Student exercises: students are following the directions of a recipe (presented either orally or in visual form) in working with materials such as laboratory equipment, maps or tools. The student's activities are determined by the teacher in a manner that results in students' thought and actions being directed toward pre-specified or "correct" results.

IV. INDIRECT VERBAL

This category is characterized by verbal interaction between teacher and students, and between students and students, which goes beyond simple and limited response to teacher stimuli. The students' verbalization influences the pattern of the interaction.

6. Teacher questions: questions of an open ended nature which are probing and necessitate individual student thought and for which variations in response are accepted. Students play a major role in determining the pattern of the verbal interaction.

7. Teacher response: teacher is responding to student questions or comments. The response may or may not be demanded by the student verbalization and it may itself be a question, but it is in direct response to student's questions or comments.

8. Teacher guidance: teacher guidance of inter-student discussion, planning, or presentation to stimulate and keep it thought provoking and to avoid shallowness and tengential trivia. The interaction is largely between students and the teacher serves only in the role of moderator or consultant.

V. INDIRECT NON-VERBAL

This category is characterized by student work that is not limited to verbal activity, but includes work with materials. In addition, the activity is not teacher dominated but gives the student varying degrees of autonomy.

9. Teacher planned investigation: student investigations in which the problems pursued are determined by the teacher, laboratory manual or guide rather than by the student. Outcomes, however, are not prespecified, i.e., no specific "recipe" is followed and all students do not necessarily follow the same routine.

10. Student planned investigations: student investigations in which the student participates in determining the specific problem he will pursue. The investigation is student planned and conducted and the teacher's guidance is limited to monitoring, encouragement and reference help.

## Teaching Strategies Observation Differential (Form E)

| Interval | Doodle Space | Rating |
|---|---|---|
| 1 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 2 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 3 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 4 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 5 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 6 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 7 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 8 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 9 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 10 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 11 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 12 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 13 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 14 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 15 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 16 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 17 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 18 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 19 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 20 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 21 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 22 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 23 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 24 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 25 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 26 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 27 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 28 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 29 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |
| 30 | | $0_1$ $0_2$ 1 2 3 4 5 6 7 8 9 10 |

Subtotal _____

Rater _____ Teacher _____ School _____

Date _____ Average Rating _____